

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of claims:

Claims 1-48 (canceled)

Claim 49 (new): A gas pressure regulator comprising:

an electrochemical cell including a first electrode for decomposing a gas into one or more ions, a second electrode for converting the ions generated in the first electrode into the gas again and an ion conductor sandwiched in between both the first and second electrodes;

a high pressure vessel disposed on a first side of the electrochemical cell;

a low pressure vessel disposed on a second side of the electrochemical cell; and

a hydrogen gas reservoir connected to the high pressure vessel and the low pressure vessel.

Claim 50 (new): The gas pressure regulator according to claim 49, further comprising a member for supplying a control current to both ends of the first electrode and the second electrode, wherein a quantity of the control current is controlled to control a flow rate of gas flowing across both the electrodes.

Claim 51 (new): The gas pressure regulator according to claim 49, wherein the ion conductor includes a film that includes an electrolyte material capable of permeating the ionized gas.

Claim 52 (new): The gas pressure regulator according to claim 49, wherein the first electrode and the second electrode includes an electrode film on which a catalyst capable of ionic equilibrium of the gas is carried.

Claim 53 (new): The gas pressure regulator according to claim 49, wherein a low pressure vessel is disposed in another side of the electrochemical cell, and wherein the electrochemical cell serves as a gas partition wall and has a member for regulating pressure by

controlling a potential between both the first and second electrode when a pressure difference is generated between both sides of the electrochemical cell.

Claim 54 (new): The gas pressure regulator according to claim 53, wherein an electromotive force generated from the pressure difference is short-circuited by a relay to measure and regulate pressure, or the pressure is regulated by a variable resistor.

Claim 55 (new): The gas pressure regulator according to claim 49, wherein a plurality of electrochemical cells are arranged in parallel in a gas flowing direction and has a multistage structure.

Claim 56 (new): The gas pressure regulator according to claim 49, wherein both sides of the electrochemical cell serving as gas partition wall have closed vessels, wherein one side serves as a high pressure gas tank and an opposite side is connected to a gas consuming system, a pressure sensor is disposed in a closed vessel in the opposite side and wherein a pressure sensor interlocks with a relay switch connected between both the first and second electrodes of the electrochemical cell to compensate for the consumption of gas.

Claim 57 (new): The gas pressure regulator according to claim 49, wherein the electrochemical cell functions as a gas refining filter.

Claim 58 (new): The gas pressure regulator according to claim 49, wherein the ion conductor is a proton conductor, wherein the proton conductor is formed with a derivative by introducing a proton dissociation group to carbon atoms forming at least type of material selected from a group consisting of fullerene molecules, a cluster having carbon atoms as a main component and a structural body having tubular or linear carbons, and wherein the proton generated in the first electrode is moved to the second electrode through the proton conductor.

Claim 59 (new): The gas pressure regulator according to claim 58, wherein the proton dissociation group is -XH where X indicates an arbitrary atom or an atomic group having bivalent bonds and H indicates a hydrogen atom.

Claim 60 (new): The gas pressure regulator according to claim 59, wherein the proton dissociation group is -OH or -YOH where Y indicates an arbitrary atom or an atom group having bivalent bonds.

Claim 61 (new): The gas pressure regulator according to claim 60, wherein the proton dissociation group is selected from the group consisting of -OH, -OSO₃H, -COOH, -SO₃H, -OPO(OH)₂, and -C₆H₄-SO₃H.

Claim 62 (new): The gas pressure regulator according to claim 58, wherein the fullerene molecules are a spherical shell type carbon cluster molecule C_m where m indicates a natural number in which C_m may form a spherical shell structure.

Claim 63 (new): An electrochemical device comprising:

an electrochemical cell including a first electrode for decomposing a hydrogen gas into one or more protons, a second electrode for converting the protons generated in the first electrode into the hydrogen gas again and a proton conductor sandwiched in between both the electrodes;

a high pressure vessel disposed in a first electrode side of the electrochemical cell to accommodate a gaseous material including the hydrogen gas, wherein the high pressure vessel is connected to a hydrogen supply tank; and

a gas consuming part including a pressure reducing part in which the electrochemical cell functions to reduce pressure in the high pressure vessel, a hydrogen gas storage part disposed in contact with a second electrode side in the pressure reducing part, a third electrode disposed in contact with the hydrogen storage part to decompose the hydrogen gas supplied from the hydrogen gas storage part into protons; a fourth electrode for converting the protons generated in the third electrode into water, and a proton conductor sandwiched in between both the electrodes wherein the protons is converted into water in the fourth electrode to remove electrochemical energy between the third electrode and the fourth electrode.

Claim 64 (new): The electrochemical device according to claim 63, wherein an oxygen gas or an oxygen containing gas is supplied to a surface of the fourth electrode that does not contact the proton conductor to react with the protons passing through the proton conductor and convert the protons into water, and wherein the electrochemical energy is removed between the third electrode and the fourth electrode.

Claim 65 (new): A method for regulating a gas pressure comprising:
supplying hydrogen gas from a hydrogen supply tank to a high pressure gas storage tank adjacent a first electrode;
decomposing the gas into ions in the first electrode;
conducting the decomposed ions to a second electrode side through an ion conductor sandwiched in between the first electrode and the second electrode; and
converting the conducted ions to the gas again in the second electrode.

Claim 66 (new): The method according to claim 65, wherein a control current is supplied to both ends of the first electrode and the second electrode to control a quantity of the control current so that a flow rate of gas flows across both the electrodes.

Claim 67 (new): The method according to claim 65, wherein an electrochemical cell including the first electrode, the second electrode and the ion conductor serves as a gas partition wall and when a pressure difference is generated at both sides of the electrochemical cell, a potential between both the electrodes is controlled to regulate the pressure.

Claim 68 (new): The method according to claim 67, wherein an electromotive force generated from a pressure difference is short-circuited by a relay to measure and regulate pressure, or the pressure is regulated by a variable resistor.

Claim 69 (new): The method according to claim 67, wherein the high pressure gas storage tank is disposed at one side of the electrochemical cell serving as the gas partition wall and a closed vessel connected to a gas consuming system is disposed at the other side, wherein a

pressure sensor is disposed in the closed vessel in another side, and wherein the pressure sensor interlocks with a relay switch connected between both the first and second electrodes of the electrochemical cell to compensate for the consumption of gas.